



8/13/01 (H.E.)
J. Steptoe
8-21-01

RESPONSE UNDER 37 C.F.R.
§1.116 EXPEDITED PROCEDURE
EXAMINING GROUP 2858

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Eduard A. Cartier, et al.

Examiner: Lourdes C. Cruz

Serial No: 09/413,462

Art Unit: 2815

Filed: October 6, 1999

Docket: YOR919990358US1(12906)

For: SILICATE GATE DIELECTRIC

Dated: August 15, 2001

Assistant Commissioner for Patents
United States Patent and Trademark Office
Washington, D.C. 20231

RESPONSE UNDER 37 C.F.R. §1.116

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Sir:

In response to the Office Action dated June 20, 2001, applicants submit the following amendments and remarks for entry of record in the above-identified patent application.

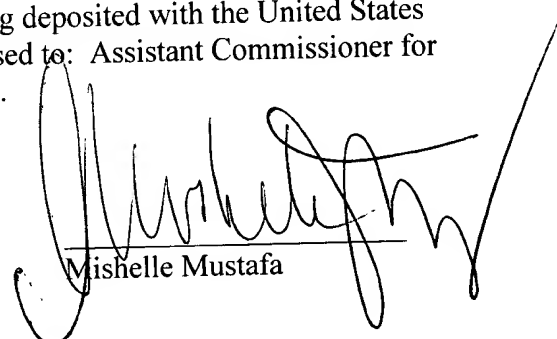
IN THE CLAIMS:

Please amend Claims 21 and 34 to read as follows:

CERTIFICATE OF MAILING UNDER 37 C.F.R. §1.8(a)

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231, on August 15, 2001.

Dated: August 15, 2001


Michelle Mustafa

B1
21. (Amended) A semiconductor structure comprising at least one metal silicate dielectric material that is formed on a silicon oxide layer, said silicon oxide layer being formed on a Si-containing substrate.

sub C5
B2
34. (Twice Amended) A capacitor comprising at least one metal silicate dielectric material sandwiched between the same or different electrode materials, wherein said at least one metal silicate is obtained by forming a metal oxide layer on a silicon-containing material and heating said metal oxide layer in the presence of an oxidizing agent under conditions so as to convert said metal oxide layer into said metal silicate while simultaneously oxidizing a portion of the silicon-containing material underlying the metal silicate.

REMARKS

Favorable reconsideration of this application in view of the foregoing amendments and remarks to follow is respectfully requested. Since the present amendment raises no new issues, and in any event, places the application in better condition for consideration on appeal, entry thereof is respectfully requested.

Before addressing the grounds of rejection raised in the present Office Action, applicants have amended Claims 21 and 34 to positively recite that the claimed metal silicate is a dielectric material. Support for this amendment to Claims 21 and 34 is found throughout the entire specification of the instant application, See, for example, Page 1, line 16; Page 2, lines 25 and 30; Page 3, line 2; Page 11, line 17; Page 12, line 1; Page 14, lines 15-24; Page 20, lines 8-10; and the abstract. Applicants respectfully submit that the amendment to Claims 21 and 34 now limits the claims to structures including 'insulating' metal silicates.

Since the above amendment to Claims 21 and 34 does not introduce any new matter into the application, entry thereof is respectfully requested. Applicants respectfully submit

that the above amendment to Claims 21 and 34 was not previously entered since it was believed that the specification of the instant application clearly defined that the metal silicates are insulating (i.e., dielectric materials).

As required by 37 C.F.R. §1.121, applicants have attached a marked-up version of the changes made to the claims by the current amendment. The marked-up attachment is captioned "Version With Markings Showing Changes Made".

Claims 21-23, 28, 29, 30, 32-34 stand rejected under 35 U.S.C. §102(b) as allegedly anticipated by U.S. Patent No. 5,418,179 to Hotta ("Hotta"). Claims 25-27 stand rejected under 35 U.S.C. §103 as allegedly unpatentable over Hotta. Additionally, Claims 24 and 31 stand rejected under 35 U.S.C. §103 as allegedly unpatentable over the combination of Hotta and U.S. Patent No. 5,306,950 to Fujikawa, et al. ("Fujikawa, et al."). Applicants respectfully traverse each of the aforementioned §§102 and 103 rejections in view of the amendments made above and the remarks to follow hereinbelow.

It is axiomatic that anticipation under §102 requires that the prior art reference disclose each and every element of the claim to which it is applied. In re King, 801 F.2d 1324, 1326, 231 USPQ 136, 138 (Fed. Cir. 1986). Thus, there must be no differences between the subject matter of the claim and the disclosure of the applied prior art reference. Stated another way, the reference must contain within its four corners adequate direction to practice the invention as claimed. The corollary of the rule is equally applicable: The absence from the applied reference of any claimed element negates anticipation. Kloster Speedsteel AB v. Crucible Inc., 793 F.2d 1565, 1571, 230 USPQ 81, 84 (Fed. Cir. 1986).

Applicants submit that the claims of the present application are not anticipated by the disclosure of Hotta since the applied prior art reference does not disclose applicants' claimed

structure that includes at least a metal silicate dielectric material formed on a silicon oxide layer. As is known to those skilled in the art, metal silicates are compounds that contain silicon, oxygen, and one or more metals. Hydrogen may also be optional present in metal silicates. See, Exhibit A for a definition of silicate.

In accordance with the present invention, the metal silicates are employed as a dielectric (i.e., insulating) material. Evidence that metal silicates can function as insulating materials is seen in the various articles attached in Exhibit B.

In contrast thereto, Hotta provides a multilayered structure wherein an upper film comprised of a refractory metal silicide (not silicate) is deposited on a lower film comprised of polysilicon. A list of refractory metal silicides such as WSi_2 , TiSi_2 , CoSi_2 , NiSi_2 , etc. is found at Col. 6, lines 54-59 of Hotta. Applicants respectfully submit that silicides are conductive compounds made of silicon combined with a refractory metal. Note the definition of 'silicides' in Exhibit A, wherein the metal is the more electropositive element.

In view of the different definitions for metal silicates and metal silicides, it is not clear to applicants how a reference that discloses metal silicides anticipates the claimed invention, which positively recites the presence of a metal silicate. Applicants respectfully submit that the two terms are not synonyms, and they are not interchangeable used by one skilled in the art. Metal silicides are binary compounds that contain Si and a metal, not Si, a metal and oxygen as do metal silicates.

Applicants further submit that silicates are chemically different than silicides because of the presence of oxygen atoms in silicates which are not present in silicides. Moreover, the metal silicates of the claimed invention are dielectric materials not conductive materials as are

the metal silicides of the prior art. In view of these differences, Hotta does not anticipate the claims of the present invention.

The foregoing remarks clearly indicate that the applied reference does not teach each and every aspect of the claimed invention, as required by King and Kloster Speedsteel; therefore the claims of the present application are not anticipated by the disclosure Hotta. Applicants thus respectfully submit that the instant §102(b) rejection has been obviated; therefore the anticipation rejection can and should be withdrawn.

Insofar as the §103 rejections are concerned, applicants submit that the applied prior art references of Hotta alone, or Hotta in combination with Fujikawa, et al. do not teach or suggest applicants' claimed structure which includes at least a metal silicate formed on a silicon oxide layer.

The primary reference spurring the §103 rejections, i.e., Hotta, is deficient for the same reasons as mentioned above concerning the §102(b) rejection; therefore those remarks are incorporated herein by reference. To reiterate: Hotta does not teach or suggest the claimed semiconductor structure which comprises, among other elements, a metal silicate dielectric material. In contrast, Hotta discloses metal silicides which are employed in the principal reference as a conductive element. Applicants find no indication of employing metal silicates in Hotta and there is no motivation therein that would suggest the presence of the same in the disclosed semiconductor structure.

Applicants again emphasize that the claimed metal silicates (which by definition include a metal, Si and oxygen) are chemically different from metal silicides which are binary compounds that include metal and Si. Applicants do not find it obvious to interchange the

two materials since the two materials are wholly different compounds (See, definitions in Exhibit A as well as previous discussion made above).

Insofar as Fujikawa, et al. is concerned, that applied secondary reference does not alleviate the above-mentioned defect in Hotta since the applied secondary reference also discloses the use of metal silicides, not metal silicates as presently claimed.

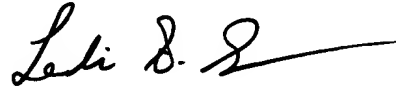
The various §103 rejections also fail because there is no motivation in the applied references which suggest modifying the structures disclosed in either applied prior art reference to arrive at applicants' claimed structure which includes a metal silicate dielectric (i.e., insulating) material. That is, applicants find no motivation in the art of record that would lead one to employ a metal silicate in the prior art structures. "The mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification." In re Vaeck, 947 F.2d, 488, 493, 20 USPQ 2d. 1438, 1442 (Fed.Cir. 1991).

The rejections under 35 U.S.C. §103 have been obviated; therefore reconsideration and withdrawal thereof is respectfully requested.

In the event the Examiner maintains her position, the undersigned invites the Examiner to telephone him to discuss the matter in greater detail.

Thus, in view of the foregoing amendments and remarks, it is firmly believed that the present case is in condition for allowance, which action is earnestly solicited.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Leslie S. Szivos", with a long horizontal flourish extending to the right.

Leslie S. Szivos
Registration No. 39,394

Scully, Scott, Murphy & Presser
400 Garden City Plaza
Garden City, New York 11530
LSS:gc